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ABSTRACT

This report discusses telecommunications as a possible medium for conducting certain types of Pacific Circle Consortium (PCC) business. Under the general heading of teleconferencing, the paper examines a number of telecommunications options including two-way video, electronic mail, slow-scan video, facsimile equipment, electronic blackboards, computer conferencing, and audio teleconferencing. Cost estimates are provided for each type of system, and it is recommended that PCC members become familiar with the lowest cost and most flexible of the various options, i.e., audio teleconferencing. It was also recommended that: (1) the Consortium use the teleconferencing services provided by Kellogg, Incorporated, of Denver, Colorado; (2) use of teleconferencing services by Consortium members initially consist of dialing from convenient locations, with use of electronic mail for correspondence and database access as a second step; and (3) the Consortium experiment with teleconferencing for the first year before purchasing or leasing the appropriate terminal equipment. Also provided are guidelines for setting up the teleconferencing services plan, including 10 protocols for ensuring a successful teleconference. A list of references is included, as well as lists of organizations providing: (1) teleconference services; and (2) audio conference terminal equipment. (JB)

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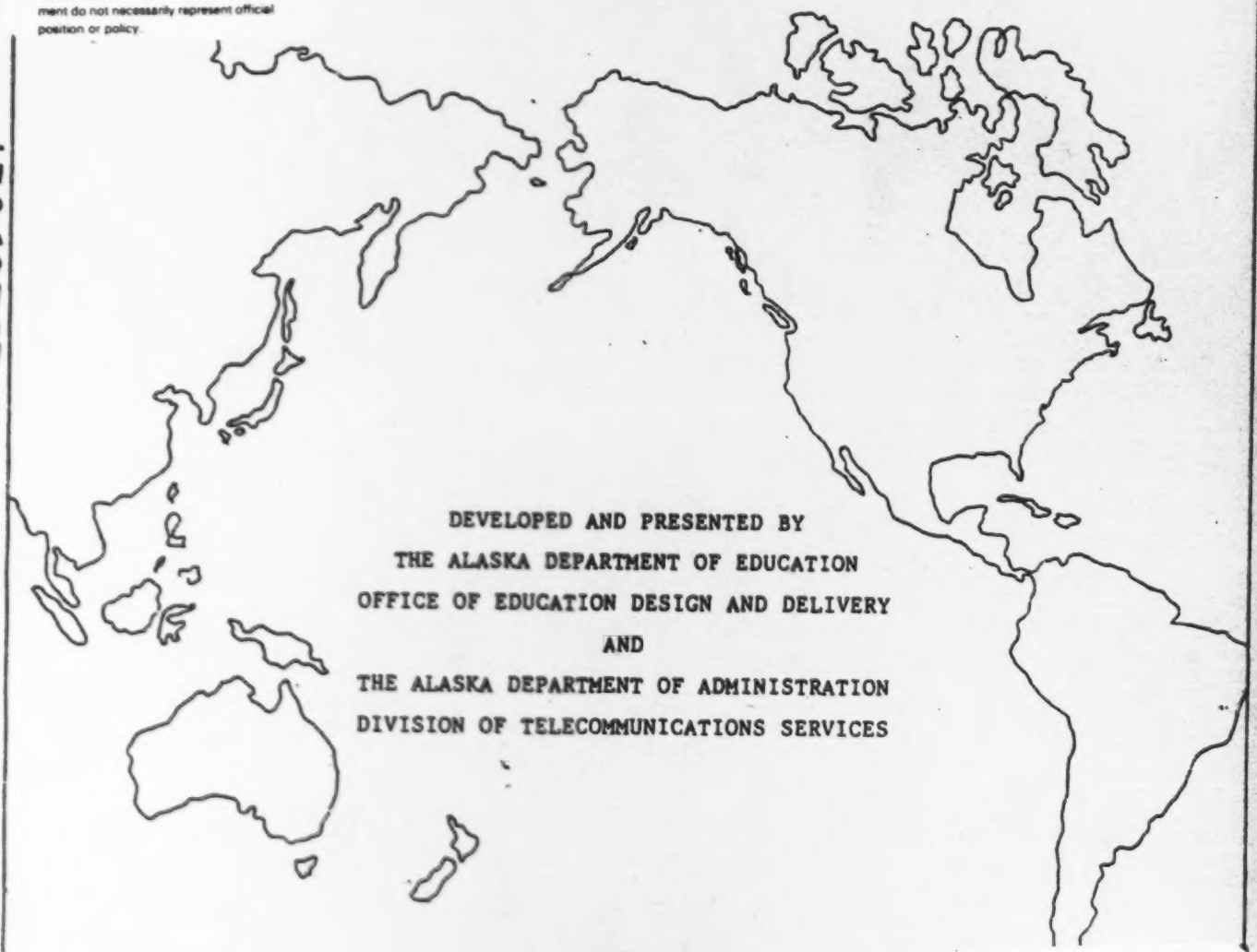
A PAPER PRESENTED BEFORE THE PACIFIC CIRCLE CONSORTIUM REGARDING THE USE OF TELECONFERENCING TO CONDUCT INTERIM BUSINESS



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SECTION ONE

EXECUTIVE SUMMARY

During the sixth Annual Conference (Hiroshima) of the Pacific Circle Consortium, the Board of Directors concurred with a suggestion to examine the potential of telecommunicatons as a possible medium for conducting certain types of Consortium business. The State of Alaska, Departments of Administration and Education, agreed to prepare a nontechnical paper for the purpose of assisting the Board in discussions related to this matter.

Under the general heading of teleconferencing, the paper examines a number of options; including two-way video, electronic mail, slow-scan video, and audio teleconferencing. In the absence of a precise statement of need, the principal author, Mr. Robert Frampton, formulated a number of recommendations around the considerations of cost and familiarity.

The paper recommends that PCC members become familiar with the lowest cost and most flexible of the various options, i.e., audio teleconferencing. In addition, it was recommended that PCC members utilize a teleconference service bureau, and that members delay purchasing any equipment until there has been greater experience with the techniques of teleconferencing. A possible second step would be the inclusion of electronic mail for the purpose of message transfer and data base access.

The authors of the paper believe that teleconferencing could do much to expedite, in a cost efficient manner, the conduct of business in the Pacific Circle Consortium.

SECTION TWO

INTRODUCTION

By eliminating distance as an obstacle to holding meetings, teleconferencing provides a method to improve the efficiency and responsiveness of transacting business. By employing teleconference services, the Pacific Circle Consortium (hereafter referred to as the "Consortium") has the ability to eliminate much of the time and expense involved in international travel to and from meetings. In addition, teleconferences will improve communications, decrease the time necessary to make decisions, and assist geographically separate members in working together on common issues in a timely manner.

Teleconferencing, as the term is used in this paper, refers to electronic communications between groups at geographically separate locations, for the purpose of conducting meetings and other common business. As such, teleconferencing can range from the simplest audio conference between two or more individuals using regular telephones, to groups assembled in conference rooms at distant locations, using hands-free conference sets.

Increased travel costs has resulted in a great amount of interest in teleconferencing. While conferencing has the potential of reducing the cost of travel to attend meetings, there are other benefits that may be of equal importance. Among these benefits are the ability to disseminate information quickly and improve efficiency of working groups that employ teleconferencing regularly to maintain a high level of understanding and coordination among group members.

In terms of productivity, the teleconference medium has considerable potential for Consortium applications and business. The Consortium can substantially reduce the time span between meetings. Teleconferencing works well for planning sessions, business meetings, strategy sessions, information exchange and group discussions. Teleconferencing can eliminate unnecessary travel, save money and time, and can be conveniently conducted over the easily accessible international telephone system. In addition, written materials and documents could be exchanged over the same telephone network.

Teleconferencing is widely used in the United States and Canada, and is beginning to gain popularity in other countries. The ability to teleconference internationally can be limited by certain restrictions or lack of agreements for telecommunications services between some countries. Current Consortium member nations do have the ability (through international telecommunications operating agreements between federal governments) to place international telephone calls. The ability to teleconference is almost as easy as placing an international telephone call.

Much of the information presented in this paper is based upon the experiences, services and technical standards of teleconference companies, telephone companies and common carriers (long distance tele-

phone traffic carrier companies) in the United States. Though similar technology is available almost worldwide, some of the equipment mentioned here may not be compatible with all foreign electrical power sources and telephone related technical standards. For example, in the United States, electrical devices usually operate on 110 volts, alternating current at 60 hertz; in many other countries electrical devices operate at 220 volts, alternating current at 50 hertz. Therefore, some teleconference equipment intended for use in North America may not be compatible with foreign telephone or electrical power services without modification (e.g., adding a power converter in line to the electrical device). This is not a major deterrent and modifications usually are minimal. A listing of companies which produce teleconference terminal equipment is presented in the appendices of this paper.

All costs described in this paper, except where noted, are presented in 1983 United States dollars. This applies to tariffed international and domestic long distance telephone calling, terminal equipment prices and teleconference service rates.

For the purpose of consistency, cost comparisons and proposed service designs, the paper considers teleconferencing services between the following Consortium member countries and states within the United States:

Canberra, Australia
Vancouver, British Columbia, Canada
London, England (CEDC)
Paris, France (CEDC)
Tokyo, Japan
Wellington, New Zealand
Anchorage, Alaska, U.S.
Juneau, Alaska, U.S.
Honolulu, Hawaii, U.S.
Salem, Oregon, U.S.

Teleconference services are by no means limited to these countries. Teleconferences can be conducted between any nations that have telephone communication circuits connecting them together. As the telephone system is accessible almost worldwide, teleconferencing has global implications and applications. Though this paper will present a model Pacific Basin teleconference service network, the concepts can be expanded to include additional nations.

International teleconferencing requires that time zone variations be taken into consideration. The earth is covered by 24 one-hour time zones; the Pacific basin alone extends over 13 of these zones. In addition, the Pacific basin is divided at the 180th meridian by the international date line; all countries to the east of this line are one

day behind all countries to the west. The chart below illustrates the time zone variations for the cities previously listed.

TUESDAY			MONDAY			
TOKYO	CANBERRA	WELLINGTON	HONOLULU/ANCHORAGE	JUNEAU/VANCOUVER/SALEM	LONDON	PARIS
9 pm	10 pm	12 mn	2 am	4 am	12 n	1 pm
9 am	10 am	12 n	2 pm	4 pm	12 mn	1 am

(mn = midnight, n = noon)

Chart No. 1

Time Zone Variations

This paper is not intended to be a technical presentation, rather it is a general overview and description of teleconferencing services, systems and resources applicable to Consortium requirements.

SECTION THREE

OBJECTIVES

The Consortium has a definite need to increase productivity while simultaneously containing expenses associated with international meetings. Semi-annual or quarterly meetings would aid the Consortium in its efforts to accomplish tasks and to exchange information in a timely manner. In addition, the ability to meet without the added burden of excessive meeting costs (as experienced with international travel) would be of value to the Consortium.

The objectives of this paper are:

- Analyze Existing Services: To analyze existing teleconference facilities, systems and services in terms of applicability, availability and accessibility to Consortium members and cost per hour of use.

- Plan Service: To develop a Consortium teleconference service plan, including costs per hour of use.

- Encourage Use: To encourage the Consortium to use teleconferencing for semi-annual and other interim business applications.

SECTION FOUR

TELECONFERENCING SERVICES

The simplest form of teleconferencing is one we all use daily -- the two party telephone call. Variations on telephone conferencing include bringing in additional telephone parties through the use of special "dial-up" teleconference services or, for meetings involving a few parties, through "operator assisted" conference services available from telephone operating companies or authorities. A step beyond telephone-based teleconferencing systems are those using dedicated or "private-line" telephone networks. Dedicated teleconference networks interconnect multiple locations with permanent leased communication circuits which are available 24 hours per day and are completely independent of the public telephone network. Though dedicated networks are well suited for agencies that conference daily from fixed locations, they are not economically feasible for Consortium applications.

Teleconferencing enhancements include one or two-way video transmission and special equipment for electronically transmitting written messages, graphic materials, and the sending of documents between teleconference sites. Such visual communication enhancements can be provided with dial-up teleconference services. While many of these enhancements can improve the effectiveness of some teleconferenced meetings, and are vital to certain types of conferences, research has indicated that a large majority of business and organizational meetings can be conducted efficiently through properly handled audio (voice) only teleconferences.

Small dial-up teleconferences involving one or two people at each location can be conducted with the typical telephone set; however, those who teleconference regularly prefer to use hands-free speaker phones or special teleconference sets that allow several persons to participate at each location. There is a fairly wide selection of such equipment available today, some of which is described later in this paper.

The decision as to how the Consortium may want to set-up a telephone-based teleconference may depend on several factors, including: the number of locations to be served; the geographical locations of conference sites; time zone variations; and, the ability of Consortium members to access the international telephone system.

The following sections of the report cover the teleconference services methods, options and costs. Audio conference enhancements are discussed and a model Consortium teleconference is provided.

Existing Teleconference Services

Presently, there are two different types of teleconference systems: dial-up and dedicated. Dial-up conference services are accessible from any telephone that can access the international telephone network. Dedicated teleconference networks employ private phone lines which form permanent communication circuits between specific locations.

Dedicated teleconference networks are very expensive as communications circuits are leased for use 24 hours per day for a given duration (months or years). A dedicated network must be used excessively (several hours per day) to justify its cost. On the other hand, dial-up conference services are simply used as required, with the conference participants or sponsor paying telephone toll and service costs.

The two most common methods of attaining dial-up teleconference services are through a telephone company conference operator or a teleconference service bureau. Both methods rely on specially designed teleconference equipment (commonly referred to as "bridges") which interconnect all conference participants into a teleconference. Accessing these teleconference services requires access to a local telephone that can dial into the international telephone network. Due to the immediate availability of dial-up teleconference services and relatively lower user costs, these types of services are presented in this paper.

Teleconference Service Bureaus

Teleconference service bureaus offer a new approach to meeting over great distances. Service bureaus specialize in teleconference applications to business, government and education operations and have local, regional, national and international conference capabilities.

Accessing the teleconference service requires conference participants to call (dial into) a central telephone number at a predetermined time. If all sites are prompt in calling, it is possible to connect, or bridge, all conference participants into a teleconference in a matter of minutes. This "meet me" approach permits the conference to start on time with a minimum of waiting. Some bureaus employ automated equipment to permit automatic conference set-up and audio level quality adjustments. Conference attendants or moderators can be available to assist with conference protocols, user training and orientation, or other specialized services.

Private teleconference service bureaus are available 24 hours per day, seven days per week; are easily accessible from any telephone; and can design special conference services to meet almost any particular conference requirement or need.

Two teleconference service providers are presently located in the western United States - Alaska and Colorado. Other bureaus also exist in the mid-western and eastern United States. Currently, as far as we know, there are no teleconference service bureaus located in southern Pacific basin nations. The actual location of a service bureau does not necessarily affect the audio quality of a teleconference, but the location does affect the costs of placing a telephone call into the service bureau. Long-distance telephone toll rates are affected by the distance between the calling and receiving locations, duration of the call, hour of the day and day of the week.

Costs - Teleconference Service Bureaus

Teleconference service bureaus usually charge for their services on a per line access basis. Each telephone call placed into a teleconference service bureau requires one telephone line; therefore, ten separate parties calling into a teleconference bureau requires ten lines. There are also telephone toll costs that vary with the distance between calling sites; the further away from the bureau a calling party is, the greater the toll charges will be.

In Alaska, the University of Alaska and Alaska State Department of Education operate a teleconference service through the State funded LEARN/Alaska program which serves rural and urban educational/instructional agencies throughout the State. The LEARN/Alaska teleconference service is free to authorized educational/instructional entities; however, toll charges must be assumed by the using agency.

In Colorado, Kellogg Corporation operates a teleconference service bureau which is available at $18.00 per hour per access or line. A multi-point, ten site teleconference would cost $180 per hour plus toll charges.

Telephone Toll Charges

All long distance telephone calls are usually charged on the basis of distance between calling points, duration, hour of the day and day of the week. Common carrier toll charges are proportionate to the distances involved and, therefore, are distance sensitive. In addition, each telephone traffic common carrier has different rates for similar types of service. These rates reflect a variety of factors; a primary cost factor is the common carrier's operating expenses. The chart below illustrates the costs of placing overseas telephone calls.

FROM	TO										TOTAL/HR
Anchorage	Canberra	Vancouver	London	Paris	Tokyo	Wellington	Anchorage	Juneau	Honolulu	Salem	
	$300	$56	$181	$210	$229	$160		$51	$105	$27	$1.319
Vancouver	Canberra	Vancouver	London	Paris	Tokyo	Wellington	Anchorage	Juneau	Honolulu	Salem	
	$165		$120	$120	$165	$165	$120	$100	$85	$31	$1,071*
Seattle	Canberra	Vancouver	London	Paris	Tokyo	Wellington	Anchorage	Juneau	Honolulu	Salem	
	$71	$28	$74	$71	$71	$71	$27	$26	$29	$23	$561
Denver	Canberra	Vancouver	London	Paris	Tokyo	Wellington	Anchorage	Juneau	Honolulu	Salem	
	$74	$43	$ 77	$81	$74	$74	$33	$25	$60	$27	$568

* $1,071 Canadian dollars are equivalent to $803 U.S. dollars.

Chart No. 2

Long Distance Telephone Toll Charges For A One-Hour Call
(Based On Direct-Distant-Dialing During Daytime Business Hours)

Operator Assisted Conference Calls

Long distance telephone traffic carriers have provided telephone conferencing service for many years. By calling the long distance conference operator, a teleconference can be arranged between distant locations. The conference operator is provided with the date and time of the conference, and participants names and telephone numbers. At the predetermined time, the conference operator calls all the conference participants, connecting them into a conference call mode. This is a simple procedure for setting up a teleconference meeting. Although the conference operator is a simple approach to teleconferencing, audio quality depends on the type of bridging equipment employed by the telephone carrier -- some older equipment cannot reliably accommodate more than four or five conferees without losing audio quality control. The conference operator does not remain on line once the teleconference is in progress. Without the operator monitoring the technical aspects of the conference, technical problems could develop diminishing the effectiveness of the conference call.

Costs - Operator Assisted Conference Call

An operator assisted conference call is a tariffed (regulated schedule of rates and fees) service offered by the long line telephone traffic carriers in the United States. As a rule, the costs for the service are based upon the highest person-to-person charge applicable between two stations participating in the teleconference; each other participating station (conference location or site) is charged 50% of the basic rate; each additional minute in excess of the initial period (usually three minutes) is charged 20% of the initial period charge. Therefore, the total charge for a conference call is the sum of the initial period and additional minute charges.

To place an operator assisted conference call through Anchorage, Alaska connecting the ten listed Consortium sites would cost $75 for the first three minutes; $25 for each additional minute plus. A one-hour Consortium teleconference would cost $1500.

To place an operator assisted conference call through Seattle, Washington connecting the same ten sites would cost $79 for the first three minutes; $8.07 for each additional minute plus tax. A one-hour Consortium teleconference would cost $539.

To place an operator-assisted conference call through Vancouver, British Columbia connecting the ten Consortium sites would cost approximately $139 for the first three minutes; $3.18 for each additional minute plus appropriate tax. A one-hour Consortium conference call would cost approximately $1,951 (Canadian currency). In United States dollars, the one-hour conference call would cost approximately $1,463 plus tax.

SECTION FIVE

TELECONFERENCING HARDWARE (TERMINAL EQUIPMENT)

One may conveniently teleconference with a typical telephone instrument however participants may use specially-designed teleconference terminal equipment which have microphones, speakers and amplification. Such equipment is well suited for the dial-up approach to teleconferencing. However, with the variety of teleconference terminal equipment available, certain hardware components require evaluation based upon actual conference needs, potential levels of use, convenience and costs. The following section describes some audio conference hardware and also includes visual teleconference transmission equipment and services.

Audio Conference Terminal Equipment

Speaker phones are a convenient teleconference tool. Readily available from most local telephone operating companies or authorities, a speaker phone is a standard telephone with a built-in loudspeaker and microphone. It is particularly effective, especially in small groups (e.g., two to six participants). Advantages of the speaker phone include it's relatively low cost ($400 to $800 per unit) and ease of use providing hands-free operation.

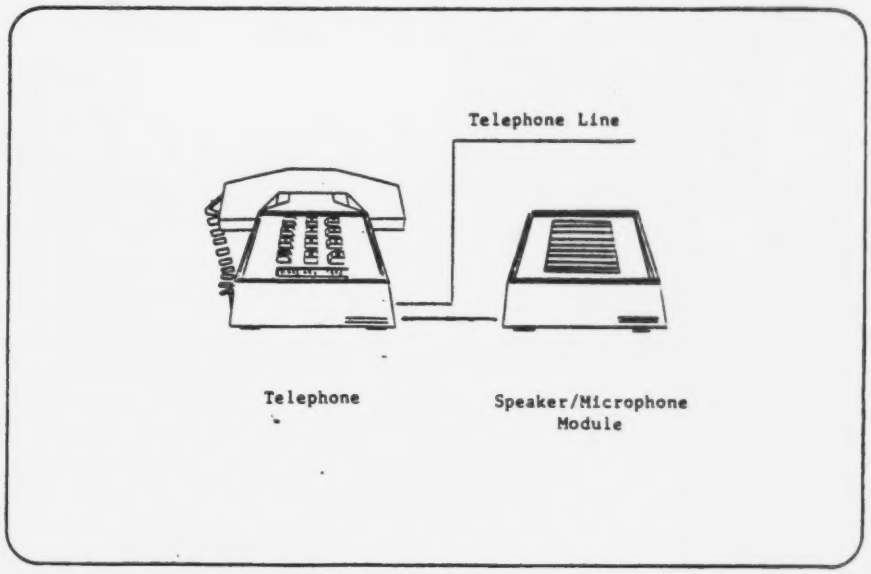

Figure One
EXAMPLE OF A SPEAKER PHONE

Audio conference sets include a variety of specially designed teleconference units adaptable for use by two to 20 participants in a particular location. The units usually include table top microphones and separate loudspeaker(s). Although some individuals are initially

intimidated by microphones, most become accustomed to them rather quickly. Audio conference sets vary in price according to the sophistication of the units. An audio conference set adequate to serve two to ten participants will cost between $600 and $5,000.

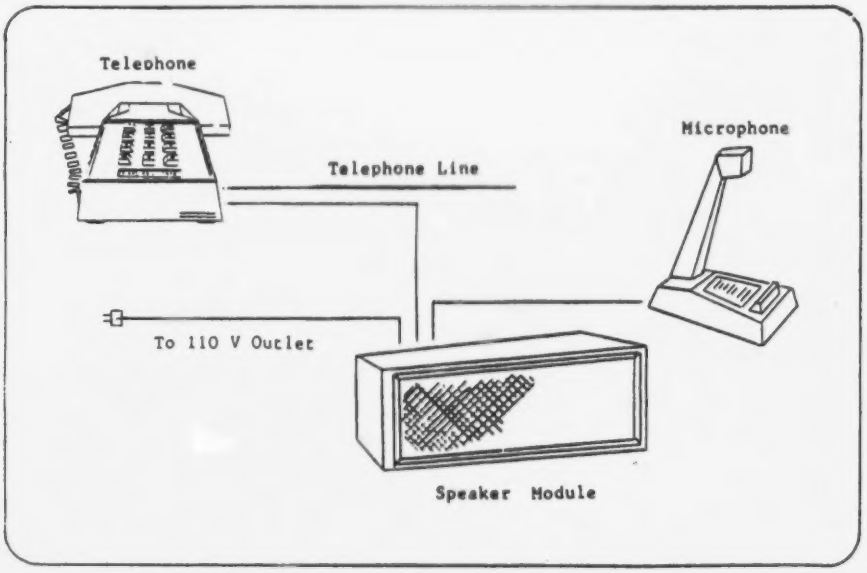

Figure Two

EXAMPLE OF AN AUDIO CONFERENCE SET

Facsimile Equipment

Facsimile equipment (commonly called "telecopiers") provides transmission of printed visual information (e.g., text, graphics and simple illustrations) over telephone lines. Facsimile is well suited for teleconference applications as it requires only telephone lines for transmission. A page of text can be transmitted to receiving sites in 30 seconds to 6 minutes. Transmission times depend upon the facsimile devices being used. The receiving site device must be compatible with the transmitting site device.

If documents are to be transmitted to more than one site, the transmitted signal must relay through a bridging device, such as a teleconference bridge, enabling all sites to receive the signal simultaneously. In a teleconference application, voice and facsimile transmissions cannot occur simultaneously unless each conference location has access to two separate telephone lines (i.e., one for voice and one for facsimile).

Facsimile equipment is easy to use and a convenient way to quickly transmit written material. However, the devices are not inexpensive, costing between $1,500 and $5,000 per unit. Price variations reflect added capabilities such as automatic operation, high speed transmission, and photocopying capabilities.

Electronic Blackboards

Electronic blackboards transmit graphic material (e.g. usually line drawings) handwritten on a pressure sensitive blackboard which converts the drawing into electrical impulses and transmits them over the telephone lines to receiving locations. Receiving locations require a television monitor which displays the illustration. As with facsimile transmission equipment, electronic blackboards are well suited for teleconference applications requiring only telephone lines for transmission. However, most electronic blackboards are not very portable requiring cumbersome equipment installations and are fairly expensive.

In addition, if information is being transmitted to multiple sites, the transmitted signal must relay through a bridging device enabling all sites to simultaneously receive the signal. In a teleconference application, voice and electronic blackboard transmission cannot occur simultaneously over the same line. Each must be transmitted separately or a second phone line must be available at each transmitting and receiving location.

Each interactive site participating in the teleconference must have the complete equipment package which costs approximately $10,000 per set-up.

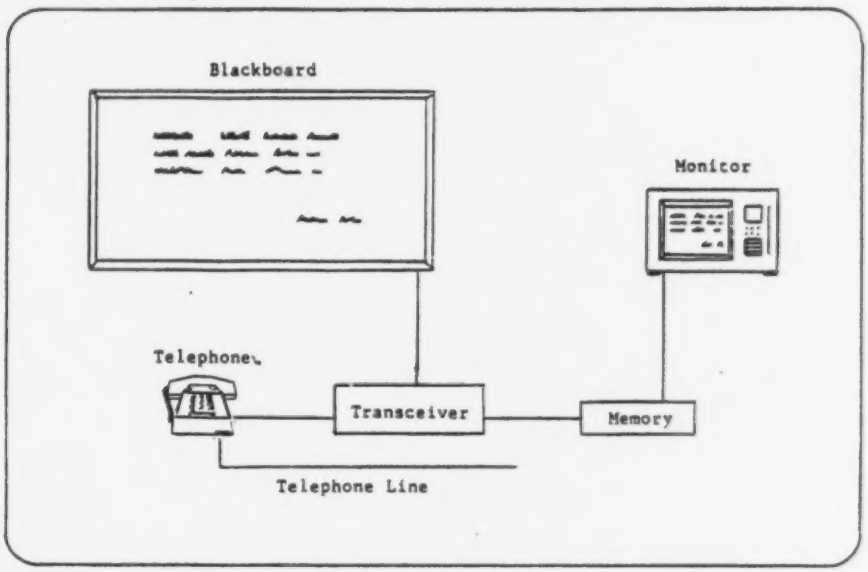

Figure Three

ELECTRONIC BLACKBOARD COMPONENTS

Electronic Mail and Computer Conferencing

Electronic mail systems are becoming increasingly popular primarily because of convenience and speed at which they transfer information between two or more locations. Instead of taking days to deliver mail via conventional postal services, electronic mail is delivered instantly via telephone lines to terminals or computers where the messages are stored or displayed. There are two electronic mail delivery systems available: a computer based system; and a self-contained system.

A computer based electronic mail system requires a central computer capable of handling the mail service. Users access the computer from remote terminals and with the simple commands write, send, or receive mail messages. Usually a variety of commands is available in these systems allowing users to direct the messages to particular receivers, store messages for future delivery or reference, verify that messages have been received and read, and, to amend or cancel previously sent messages. Depending upon the capabilities of the central computer being used for the electronic mail service, other specialized commands may be available for particular requirements or applications.

Self contained communicating devices designed solely for electronic mail applications are also available which operate independent of a centralized computer system. These devices provide some of the capabilities found in central computer based electronic mail systems, however, they are not as versatile. Easy to use, these messaging systems require the sender to create the message and to call-up the receiving terminal at which time the message is forwarded and stored for the recipient to access.

A step beyond electronic mail is that of computer-teleconferencing. Computer-conferencing provides for information to be shared between multiple locations. A file is created in the computer which becomes the conference room. Participants enter text into the file where it is organized in accordance with parameters agreed upon by the participants. Using computerized text searching capabilities participants are able to access the proceedings at a later time for review. Text can always be entered when a participant has additional information to be presented into the proceedings. Because participants are not required to be assembled in a central face-to-face conference setting, they can conveniently review the text or proceedings, add to it or provide notes and comments as required. Other services usually common to computer conferencing systems include: an electronic bulletin board or news page for general group notices; storage files for participant notes; voting and polling functions; and, among others, an on-line, real-time conference mode of simultaneous, interactive text exchange.

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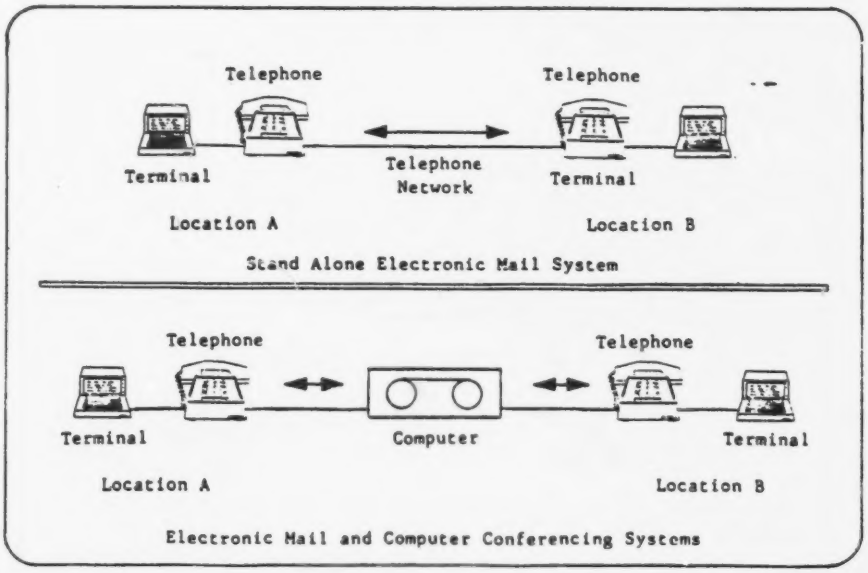

Figure Four
EXAMPLE OF ELECTRONIC MAIL AND COMPUTER CONFERENCING SYSTEMS

The cost of self contained electronic mail communicating device that operates independent of a central computer system is approximately $1,500. A minimum of two terminals are required to establish the mail service. Telephone toll charges must also be taken into consideration.

Cost of a computer based electronic mail service usually include an initial account fee (sometimes a fixed recurring monthly charge). Users are also charged for costs based upon the length of computer connect time, the number of characters sent or received and the number of messages sent or received. For example, a user may pay a $50 per month fixed account fee and 50 to 75 cents for a 500 character message. In addition, the user must pay long distance telephone interconnect toll charge. Terminals for access to the computer can be purchased for approximately $400.

The cost of computer conferencing services vary with the different service providers, but usually include similar pricing structures. An account may cost $50 per month with a computer connect charge of $10 per hour, a central processing unit charge of $2 per hour, and $75 per month storage charge per million characters (approximately 350 pages of text). In addition, the user must pay the long distance telephone interconnect charge to access the computer. Terminals for computer access can be purchased for approximately $400.

Slow Scan Video

Slow scan video, also commonly referred to as "freeze frame" video, is a still frame, narrow band, video transmission technique used to send non-motion pictorial information. Because it is a narrow band transmission, slow scan video can be translated over normal telephone lines. In use, slow scan video looks very much like a series of black and white slides. Color units are available at considerably more cost. Like electronic blackboards, slow scan equipment is cumbersome and is best suited to permanent installations. However, portable field units are available.

Similar to electronic blackboards and facsimile transmission, slow scan video cannot be transmitted simultaneously with voice unless two separate phone lines are used at each transmitting or receiving site. In addition, for multiple site transmissions, bridging is required to relay the video transmission. Equipment required includes television camera(s), video bandwidth compressor, acoustic coupler, video expander and a television monitor. Cost per unit ranges from $12,000 per site to $25,000.

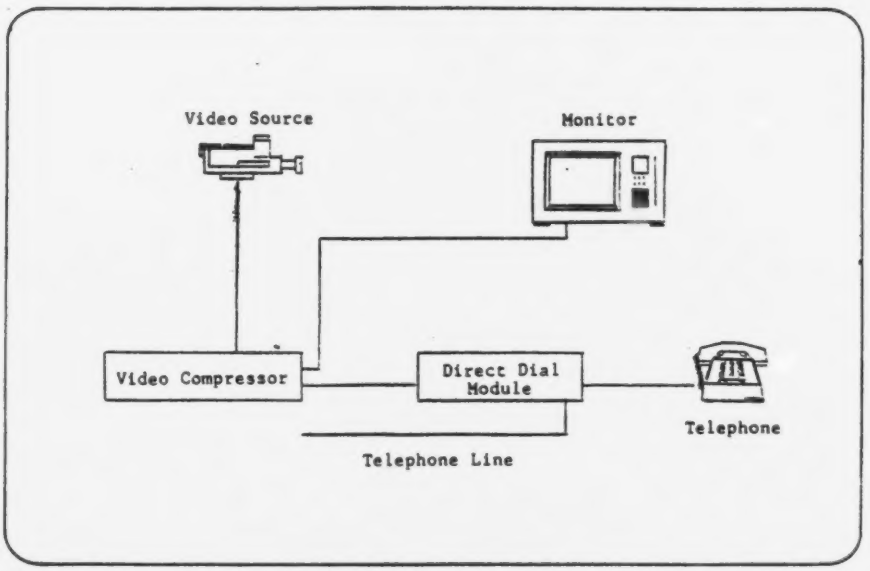

Figure Five

SLOW SCAN VIDEO COMPONENTS

Full Motion Video

The concept of closed-circuit televised meetings has gained considerable prominence in the past few years. With the introduction of new satellites making more transponder (channel) space available for video traffic, full motion video conferencing will continue to grow. In addition, as video compression techniques are refined, these video conference services will become increasingly affordable. However, at this time, video teleconferences are expensive, require exacting coordination and planning, and are not necessarily available to every community with telephone communications.

There are two forms of video conferencing: 1) interactive two-way video, and 2) non-interactive one-way video. Both forms of video conferencing include interactive audio conference capabilities.

Two-way video becomes very complicated and expensive if international service is required. Its expense for small group applications may well exceed the costs of actual face-to-face meetings including travel costs. One-way video accompanied with interactive two-way audio is similar to a television broadcast with the audience capable of interacting off screen via audio conferencing techniques. Considering the composition of the Consortium, a one-way video conference may also exceed the costs of face-to-face meetings including international travel costs. Being in the formative stages, the next few years of technology refinement may bring the costs of one-way and two-way video conferences within a more reasonable reach.

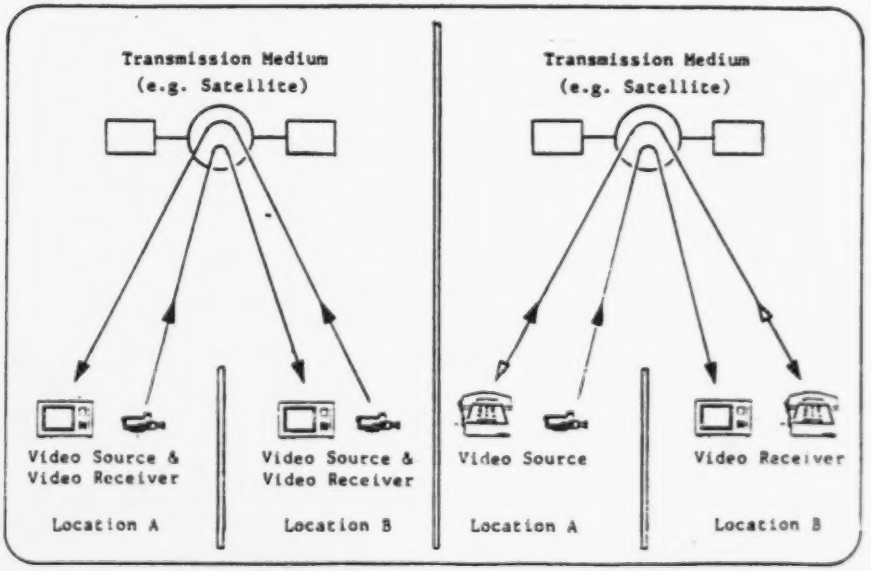

Figure Six
TWO-WAY VIDEO CONFERENCE

Figure Seven
ONE-WAY VIDEO CONFERENCE

The costs for such video conference services are difficult to estimate, however, for a ten-point two-way interactive video teleconference, the costs would probably exceed $200,000 per hour; a ten-point one-way video conference would probably exceed $100,000 per hour. These figures include interactive audio services. Cost figures include television production and reception facilities, terrestrial communication circuits, satellite uplink/downlink, space (satellite) segment, transportable earth station, and professional technical consulting services.

SECTION SIX

OPTIONS AND COSTS

This section pertain to audio conference services and terminal equipment options immediately accessible and applicable to potential Consortium teleconferences. Ease of access and use, advantages and disadvantages, and costs are considered under each option classification.

Teleconference services options include both dial-up teleconference service bureaus and common carrier operator assisted conference services. Dedicated teleconference networks are not considered as their monthly recurring costs exceed benefits derived for the initial low volume of teleconference traffic expected from the Consortium.

Teleconference terminal equipment may be considered enhancements to basic teleconference services. Basic service only requires access to the international telephone system. However, sophisticated terminal equipment with special features can increase the value of teleconferencing by offering a greater variety of services during a teleconference.

Three classifications of terminal equipment are considered: audio conference terminal devices; electronic mail and computer conferencing; and, document processing devices (telecopiers). Other enhancements, including full motion video, slow scan video, and electronic blackboards are not discussed further due to their relatively high costs.

Teleconference Services Options

Common Carrier Operator-Assisted Conference Services: In the continental United States, Bell System operating companies provide operator assisted conference calls with three to 58 lines worldwide. In western Canada, British Columbia Tel provides operator-assisted conference calls with 3 to 40 lines worldwide. In Alaska, Alascom, Incorporated provides operator assisted conference calls with 3 to 48 lines worldwide (effective September 14, 1983).

All common carrier operator-assisted conference calls services have similar methods of setting up the conference call, however the service is offered at different rates by each company. Much of the rate difference is based upon the distance between calling sites. For example, it is more expensive to call Anchorage, Alaska from Canberra, Australia then it is to call Anchorage from Tokyo, Japan because of the increased distance between calling sites.

Costs: The following costs illustrate a one-hour operator-assisted conference call connecting the ten Consortium sites during day-time business hours.

Pacific Northwest Bell (Seattle)	$ 539 per hour
British Columbia Tel (Vancouver)	$1,463 per hour
Alascom, Incorporated (Anchorage)	$1,500 per hour

Advantages: The common carrier operator-assisted conference service is easily accessed from any standard telephone. The service is convenient and easy to use. Audio levels and quality are adequate. Billings can be centralized or sent to individual conference participants. Costs include both the long distance telephone toll charge, operator assistance and conference service.

Disadvantages: The operator does not stay on the line once the conference is established. This leaves the possibility for technical difficulties to arise. For example, if one conference participant is inadvertently disconnected from the conference, the operator may not be aware of it. Audio quality or levels are not monitored. Participants must be at predetermined telephone number in order to be contacted by the operator. This restricts the participant's mobility. The operator also prefers a 24 hour advance notice to schedule a conference.

Private Teleconference Service Bureau: In the United States teleconference service bureaus provide a direct dial conference service. Service is available worldwide from any telephone exchange connecting with the international telephone system. In the western United States, Kellogg Corporation provides conference services with 3 to 40 lines worldwide. There are other similar teleconference bureaus throughout the United States. In Alaska, the Learn/ALASKA Audio Conference Network provides conference services with 3 to 80 lines worldwide. Learn/ALASKA is an educational teleconference network owned and operated by State funded agencies. Bell Canada also offers a conference service, however a participant must be located in eastern Canada in order to access the service.

All teleconference service bureaus offer a similar service; conferees simply dial the conference service bridge telephone number which connects them into a conference mode. However, rates for conference services do vary. In addition, long distance toll charges vary depending upon the distance between the calling party and conference service location, and the rates charged by companies providing the telephone connections.

Costs: The following costs illustrate a one-hour teleconference. Three figures are shown: one for the conference services; one for the long distance toll charge; and the total hourly conference call charge. Conference service charges are based on basic teleconference services (e.g., no moderator) and per hour per line accessed. Toll charges reflect day-time business hourly rates, station-to-station calling, for the ten Consortium locations.

Company (location)	Service	Toll	Total/ Per Hour
Kellogg Conference Svc. (Denver)	$ 180	$ 634	$ 814
Learn/ALASKA Conference Svc. (Anchorage)	Free	$1,318	$1,318

Advantages: Teleconference service bureaus are accessible from any telephone worldwide that can access the international telephone system. Services are available 24 hours per day, seven days per week. Special services can be provided such as moderators, transcriptions and

separate billings. Automated equipment can be employed to provide automatic conference set-up, and audio level and quality adjustments.

Disadvantages: Audio quality control is limited by the long distance telephone connection. Users are billed for the teleconference service only; toll charges are billed by the common carrier. This can be eliminated if the calling parties call the service bureau collect, the conference service calls conferees, or a third party billing is used. Under this arrangement, the service bureau would bill the conference sponsor with two bills: one for the conference services and one for the toll charges.

Teleconference Terminal Equipment Options

While use of the standard telephone as a teleconference terminal is an option, it is not truly optional in an "either-or" sense because it is generally used in conjunction with more elaborate teleconference audio terminals. The telephone generally provides the interface between the audio terminal device and the telephone network.

Speaker Phones: As an enhancement to the basic telephone, the speaker phone provides for hands-free telephone conversations. In essence, the phone incorporates both a speaker and a microphone so that the caller does not have to hold a telephone handset. The speaker phone can also be used in a normal telephone operating mode. For teleconferencing applications, the speaker phone allows for several persons in a room to participate in the teleconference.

Costs: The price ranges between $400 and $800 per unit. Prices may vary in other countries. Contact your local telephone operating company or authority.

Advantages: Relatively inexpensive, easy to install and operate. Provides for hands-free operation and can adequately accommodate small groups (2 to 6 participates) per conference location. Can be used as a regular telephone. Attaches to existing telephone line.

Disadvantages: A speaker phone has an "open" microphone. This can result in ambient room noises being transmitted during the teleconference. Therefore, one must be sure that the speaker phone is placed so it will not pick-up the sounds produced by street traffic, ventilation systems, side conversations and the like. Often times, at receiving sites a speaker phone has a sound effect similar to talking into a barrel (i.e., slight reverberation or echo sound). This "barrel effect" can be eliminated if participants talk directly and closely to the speaker phone microphone. If participants are several feet from the phone, audio levels are low resulting in voice "clipping" (i.e., voice dropping out or being lost).

Audio Conference Sets: An improvement over basic telephone teleconferencing is the audio conference set which comprises a speaker with volume controls and a microphone. The device plugs into a standard telephone line or telephone instrument.

Costs: Units prices vary between $600 and $5,000. Prices may vary in other countries. Units are not generally available from local telephone operating companies or authorities. Most units are sold directly from the manufacturer, although some communications vendors may offer them.

Advantages: The microphones are usually activated by a switch or "press-to-talk" bar. This features eliminates the possibility of side conversations being transmitted over the network which voice activated microphones are prone to do. Many audio conference sets are portable, easy to set-up and easy to use. The sets usually have multiple microphones (2 to 10). This feature is suited for a large conference rooms with several participants.

Disadvantages: Audio conference units should be set-up and tested prior to a teleconference to ensure that all microphones and the speaker are properly operating. Voice activated microphones can inadvertently transmit ambient room sounds over the telephone system which can be bothersome to listeners. Some people are not comfortable talking into microphones, however "mike fright" is usually overcome after a few teleconferences.

Electronic Mail

Electronic mail systems forward messages over the telephone network to one or more locations. Both self contained stand alone and computer based mail systems are available. The stand alone system forwards messages directly to a receiving terminal; the computer based system forwards messages into a central computer where the message is stored until accessed by the receiving party.

Costs: Self contained stand alone mail systems cost approximately $1,500 per unit. The units can also be leased for approximately $50 per month. Each site participating in electronic mail exchange requires a mail terminal. Computer based mail systems usually have a fixed monthly recurring charge (approximately $50 per month) per user plus computer connect charges (approximately $2 per hour or fraction thereof) and charges for the number of messages sent or received (approximately 50 to 75 cents per 500 character message). Each site requires a terminal to access the computer which cost approximately $400 each. In addition, long distance telephone charges must be taken into consideration.

Advantages: The receiver of an electronic mail message does not have to be present in order to receive the message; it is stored until accessed. Computer based mail systems are capable of forwarding message to single or multiple receivers, filing message for future reference, amending or cancelling previously sent and unread messages and, among other capabilities, verifying messages have been received and read. With either system, messages can be conveniently written off line, edited and then transmitted over the telephone network during the late evening or early morning hours effectively reducing telephone toll costs. Terminals are usually portable.

Disadvantages: Self contained stand alone mail systems are not as versatile as computer based systems which have substantial electronic mail software programs. Computer based system, however, requires two telephone calls to complete a mail transaction: one from the sender forwarding the message to the computer for storage; and, one from the receiver accessing the computer for the mail message.

Computer Conferencing

Computer conferencing is designed to accommodate simultaneous textual information exchange on a group basis. It differs from electronic mail in that computer conferencing provides for real-time, synchronous interaction between conferees. It also will manage information exchange on a non-real-time basis whereby conferees access the computer to review previous conference proceedings. Computer conferencing takes place between conferees using computer terminals and a central computer that is synonymous to an electronic conference room. Computer text management capabilities (text searching, editing, filing and organizing) suit flexible conference formats. Additional capabilities usually provide for decision making functions (voting, polling), news exchange (electronic bulletin boards), storage files (personal notes) and, among others, electronic mail service.

Costs: These vary with different service providers. Some companies charge a flat monthly group fee ($200) with extra charges levied for additional computer space used ($10 per month per 100 pages of text). Others charge for service based on a monthly fee of $10, $50 per hour for computer connect time, $2 per hour for central processing unit time, and $75 per month per million characters of storage space. Terminals cost approximately $400 each. Long distance telephone toll charges must be considered.

Advantages: Interaction either in real-time or on a delayed basis (non-real-time) thereby overcoming time as well as geographic limitations. Ability to develop reports and documents compiled by several parties. Highly acceptable for exchanging opinions and information on a wide range of subjects. On non-real-time applications it provides time to evaluate and react on particular subjects. Terminals are usually portable.

Disadvantages: Requires users training in order to use the service to its full advantage. For international applications, high telephone toll charges can be expected.

Facsimile Transmission Equipment: As an enhancement to audio conferencing, facsimile devices send and receive printed material over standard telephone lines. Facsimile is well suited for teleconference applications requiring transmission of documents and agendas or last minute material. The devices are available in a variety of sizes (e.g., portable to permanent installation) and can transmit documents in less than one minute per page to six minutes per page. However, all units employed in a teleconference must be technically compatible.

Costs: Prices vary between $1,500 and $15,000 per unit. The more expensive devices are capable of automatic operation and can be programmed to transmit documents at specific times (e.g., in the late evening when long distance telephone rates are lower). --

Advantages: Provides for rapid transmission of documents between two or more sites. If more than one site is receiving a facsimile transmission, a teleconferencing bridge is required to transmit the signal to all sites. Some units also provide a local copying capability (e.g., similar to a document copier). Portable units are easy to use and to set-up.

Disadvantages: All telecopiers used in multi-point teleconferences must be compatible. If only one phone line is available at each teleconference site, the teleconference must be interrupted in order to transmit the document. Quality of the received printed page depends upon the clarity of the telephone lines used to transmit the document (e.g., a telephone line with static noise will not produce a "clean" telecopy).

SECTION SEVEN

RECOMMENDATIONS AND COSTS

Recommendation

As a first step, it is recommended that the Consortium adopt the teleconference service bureau option to obtain teleconference services. It is recommended that Consortium not adopt any of the terminal equipment options presented, however, this decision may best be left to the discretion of individual conferees.

Specifically, it is recommended that the Consortium use the teleconferences services provided by Kellogg, Incorporated of Denver, Colorado; and, that the Consortium members initially teleconference by simply dialing into the teleconference service from convenient locations. The adoption of this recommendation should be viewed as a precursor to consideration of a second step; the utilization of electronic mail for the purpose of correspondence and data base access.

The Consortium has a basic requirement to meet more frequently in order to accomplish tasks in a timely manner. Concurrently, the Consortium must minimize the costs associated with meetings since they require international travel, lodging and meeting facilities. Face-to-face annual meetings of the Consortium are necessary and it is not proposed that these be substituted with teleconferencing. However, all interim meetings can be conveniently held by teleconferencing and at a modest cost.

Teleconference terminal equipment options presented are enhancements to basic teleconferencing. All enhancements require additional capital money or, if leased, will have monthly recurring costs. The expenses are unnecessary unless the Consortium is committed to frequent teleconferencing with several participants per conference site. Rather, it is proposed that the Consortium experiment with teleconferencing for the first year. If the Consortium finds teleconferencing to be of value, then it may consider purchasing, or leasing, the appropriate terminal equipment.

The cost of an international Consortium teleconference is $180 per hour for the recommended teleconference service bureau and $634 per hour for the telephone toll charges. Total one hour teleconference costs will be $814. These costs are based upon the basic teleconference service and day rate, station-to-station tariffed toll charges.

SECTION EIGHT

PROPOSED PLAN AND IMPLEMENTATION

The following teleconferencing services plan is proposed to assist the Consortium in conducting it's first dial-up teleconference. The plan covers basic steps and procedures. Most of the steps are easily accomplished, requiring a few hours of preparation. Additional items presented cover protocols and suggestions to accomplish business in an comfortable, convenient and expedient manner.

It is recommended that the Consortium conduct its first teleconference within four months of adjourning the present annual meeting. The topic selected for the teleconference (i.e., purpose for holding the teleconference) is best selected by a committee working on a particular project. The committee selected should appoint a communications chairman who would be responsible for coordinating the teleconference.

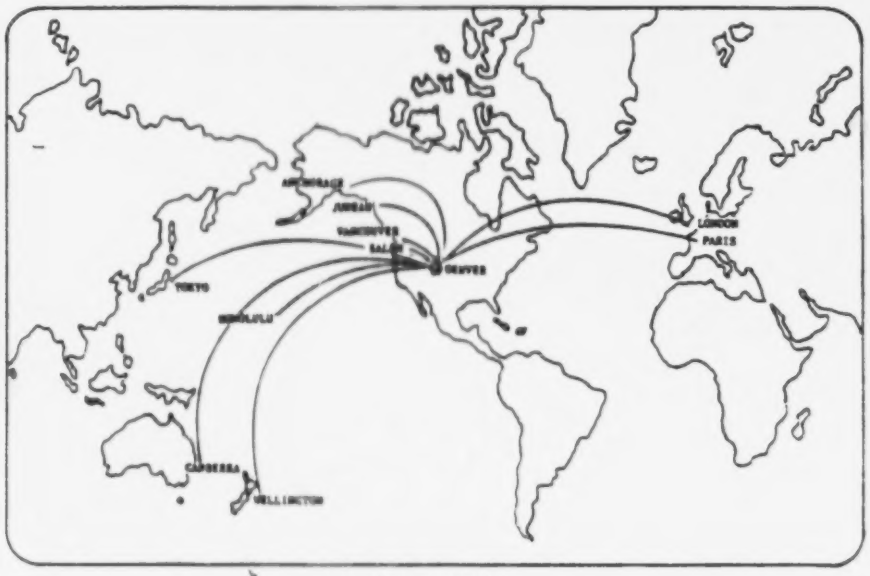

Figure Eight

DIRECT DISTANT DIALING TO A TELECONFERENCE SERVICE BUREAU

All sites participating in a teleconference simply dial into a central teleconference bureau. The bureau connects all calling sites, thereby forming an "ad hoc" teleconference network.

Setting up the Teleconferences

The Communication Chairman contacts all committee representatives by letter to determine the date and time best suited for a committee teleconference. Remembering that most Consortium members reside in different time zones, the Chairman may wish to propose several meeting dates and times. Once a concensus is reached, the Chairman contacts the teleconference service bureau to schedule and reserve the date and time for the teleconference.

BEST COPY AVAILABLE

The teleconference service bureau will provide the Chairman with a telephone number that all committee members will call on the selected date and time.

An alternative to having committee members calling into the teleconference service bureau is to have the service bureau call the individual representatives. The advantage to this approach is that it may be less expensive to call each member from the United States than for them to call into the United States. The costs of calling from the United States has been listed previously, however each committee member can contact their operating telephone company or authority to determine the costs of a one hour, station-to-station call to Denver, Colorado where the teleconference service bureau recommended is located. If the calling cost is greater than a call placed from the United States, then it may justify having the teleconference service bureau contact all representatives individually. For this approach the teleconference service bureau will have to charge a slight additional service fee; and the committee representative must be at a predetermined telephone number at the appropriate time to receive the conference call.

The next step is for the Communications Chairman to develop a committee agenda with the Committee Chairman. Printed materials (e.g., committee reports, documents, etc.) should be compiled at this time. The agenda and package of materials is sent to all committee representatives several weeks prior to the teleconference. This lead time ensures that all materials arrive at the proper destination in advance of the teleconference.

If desired, a week or two prior to the teleconference remind all conference participants, in writing, of the date, time, telephone number, purpose of meeting and the desired results. The better prepared the participants are for the teleconference, the more successful it will be.

The Actual Teleconference

The teleconference requires a moderator. It can be anyone; a likely choice is the Committee Chairman. The moderator is similar to a program host and keeps the teleconference on track. The moderator has the agenda to follow, a list of participants, performs a roll call to ensure that all sites are on line, makes the welcoming statements and introductions. This approach is like a verbal handshake that is both important and courteous. The intention is to establish rapport and make all participants comfortable with a new approach to meeting.

When conducting a teleconference, the following protocols are simple yet important aids to ensure a successful teleconference:

1) Begin on time. Clearly indicate the time the meeting will end.

2) Clearly designate the chairman who will be moderating the meeting.

3) Take a few minutes in the beginning for the "warm-up" or "verbal handshake." Request each participant to introduce him or herself and make a few comments. This allows for each participant to become more comfortable with meeting by telephone, (if appropriate, this time can be used for trading in house humor, anecdotes, quips, etc. just as one may do in a face-to-face meeting). This one step will make the meeting more successful by getting it started in a pleasant manner.

4) The Chairman should clearly define the purpose of the meeting and the anticipated or expected goals. This person directs the meeting, calls on the various participants, and introduces the related topics requiring discussion. Each conference location is polled regularly to encourage each individual to speak. Specifically calling upon a participant by name makes him or her part of the proceedings and provides a comfortable conference atmosphere.

5) Each time a participant speaks, he should identify himself unless all voices are well recognized and/or the teleconference consists of a very few participants. Example:

"This is Joseph in Vancouver and I agree with Robert in Wellington. . . ."

6) Pre-sent visual information can be very effective in a teleconference.

7) If well planned, teleconferences are effective for 1 to 2 hours without loss of interest or effectiveness. If a longer period is required, schedule brief breaks.

8) At the end of the teleconference, the chairman should summarize the conference and conclusions, and poll the participants for last minute comments. If another teleconference is necessary, schedule it at this time. By doing so both time and money will be saved.

9) Before terminating the conference, request all participants to send to the Communications Chairman their written comments about the teleconference. A prepared survey sent to all participant with the agenda and conference materials is helpful for this purpose. The survey will assist the Consortium to evaluate the teleconferenced meeting. After the evaluation, the next teleconference can be restructured to meet important needs and requirements. The second teleconference will likely be more productive and comfortable.

10) Be sure to thank everyone for participating and terminate the teleconference (everyone simply hangs-up their telephones).

There are several items to remember and practice during a teleconference to make the best use of the limited time allotted:

1) Keep the conference subjects at hand. Follow the agenda as adopted by the committee.

2) Side conversations and cross talk cause confusion.

3) Maintain the momentum. One of the moderator's responsibilities is to avoid wasted "dead-air" time. Dead air time is more noticeable during a teleconference than during a face-to-face meeting. It can be prevented by bringing the conference participants back to the actual topic under discussion. If it is necessary to temporarily stop the proceedings for consultation or a brief review of materials, announce the break so that all participants know exactly what is occurring.

4) Participants should interact normally and take notes on those items they wish to comment or speak upon later. The moderator should occasionally poll participants to gain their comments.

5) Remember that teleconferencing is an interactive medium requiring verbal exchange. Normal body language (nods, gestures, expressions) cannot be seen over a audio teleconference. Comments are most effective when clearly spoken.

SECTION NINE

CONCLUSION

Modern communications and applied high technology are not substitutes for all face-to-face meetings nor are they intended to. However, meetings consisting of information exchange, discussion and verbal presentations can often be effectively accommodated through teleconferencing. In terms of travel avoidance and the saving of time, money, personal energy and inconvenience, teleconferencing adds a new dimension to the flow of intra-Consortium communications. The ability to pool and discuss ideas is an essential part of the interactive process of any organization. Teleconferencing enhances this process by providing an unique resource.

The face-to-face meeting is a very old institution and initial resistance can be expected when one is about to embark upon a new approach to meeting. A host of factors compliment this resistance. However, the successful implementation of the proposed teleconference service plan may require one or two "experimental" teleconference to show hesitant and non-users that the medium is a convenient and effective means to exchange information. With a positive introduction to teleconferencing and it's multiple applications, reluctance will turn to interest. In the long run, economics, ease of access, convenience and increased productivity will motivate the general acceptance of teleconferencing.

The cost of teleconferencing is minimal compared to the cost of travel and time lost from one's professional occupation or private life. For approximately $850 per hour, Consortium members can meet as frequently as required without having to leave their homes or offices, unless either location is without telephone service.

The proposed teleconference service plan is simple and straight forward. It does not suggest optional enhancements to basic teleconferencing services, such as the varied group audio terminals, electronic graphic and facsimile devices, or slow scan video. Although these devices increase the range of meeting applications, their expense exceeds the benefits derived from initial Consortium applications. After the Consortium has experienced a few teleconferences, the devices may be reconsidered to determine their potential value to Consortium requirements. This also applies to video conferencing. Studies indicate that the costs of two-way video is not often justified by the additional visual benefits it brings to teleconferencing. Audio conferencing as an alternative to face-to-face meetings is applicable to only 30-40% of all meeting requirements and the addition of two-way video increases conference applications by only five percent.

Teleconferencing is becoming increasingly popular and more widely used on both the national and international level. It is used to share, inform and to resolve. It is hoped that the Consortium will considered the proposed teleconference plan and conduct a teleconference or two to see for itself the value and benefits to be gained, thus increasingly the overall effectiveness and success of the Pacific Circle Consortium.

SECTION TEN

APPENDICES

A. Reference - Additional Reading Material

For additional information on teleconferencing, services, systems and methods, Consortium members may wish to review some of the following publications.

Lazer, Elton, Johnson, et al., The Teleconferencing Handbook - A Guide to Cost Effective Communications, Knowledge Industries Publications, Inc., New York, 1983.

The TeleSpan Newsletter, Elliot Gold, Ed., Vol. 1-3, 1981-1983.

TeleComs, Interactive Telecommunications Newsletter, Susan Hawell, Ed., Vol. 1-6, 1978-1983.

Teleconference, The Business Communications Newsletter, Terry Kaufman, Ed., Vol. 1-2, 1982-1983.

Communications News, "Teleconferencing a Special Report," Donald Wiley Ed., Vol. 20, No. 2, February 1983, pp. 52-58.

Telecommunications Policy, John Edmondson, Ed., "Multilocation Audiographic Conferencing," Christopher Stockbridge, Vol. 4, No. 2, June 1980, pp. 96-107.

Teleconferencing, A System to Serve the Executive Branch, Department of Administration, Division of Telecommunications Services, Juneau, Alaska 99811, August 1982.

Jull, McCaughern, et al., Research Report on Teleconferencing, Vol. 1-2, Communications Research Center Report No. 1281-1, Department of Communications, Ottawa, Canada, January 1976.

Telecommunications in Alaska, Robert Walp, Ed., "Telecommunications Systems Enhance Participatory Government," Kathleen Baltes, Pacific Telecommunications Council, January 1982, pp. 74-84.

B. Teleconference Services

Kellogg Communications
5601 South Broadway
Lettleton, Colorado 80121
(303) 794-1818

Connex International
12 West Street
Danbury, Connecticut
(800) 243-9430/(203) 797-9060

The Darome Connection
5725 East River Road
Chicagco, Illinois 60631
(800) 435-6174/(312) 399-1613

Center for Interactive Programs
University of Wisconsin Extension
975 Observatory Drive
Madision, Wisconsin 53706
(608) 262-4342

LEARN/Alaska Audio Conference Network
University of Alaska International
Telecommunications Consortium
2221 East Northern Lights Boulevard
Suite 210
Anchorage, Alaska 99504
(907) 277-1638

Bell Canada
Teleconferencing Services
410 Laurier Avenue, Station 'D'
Ottawa, Ontario K1P 6H5
(800) 267-7400/(613) 560-3207

Alascom, Incorporated
Teleconference Services
949 East 36th Avenue
Pouch 6607
Anchorage, AK 99502
(907) 264-7309

C. Audio Conference Terminal Equipment:

Darome, Incorporated
711 East Diggins Street
Harvard, Illinois 60033

Precision Components, Incorporated
1110 West National Avenue
Addison, Illlinois 60101

Western Electric Corporation
222 Broadway, 8th Floor
New York, New York 10038

Comtech
30 Plaza Drive
Westmont, Illinois 60559

CEAC, Incorporated
1500 East Conecuh
Union Springs, Alabama 36089

Shure Brothers, Incorporated
222 Hartley Avenue
Evanston, Illinois 60204

Rauland-Borg Corporation
Business Communications Division
3535 West Addision Street
Chicago, Illinois 60618